WHAT IS CLAIMED IS:

1.   A method for diagnosing abnormality and estimating degradation in a valve apparatus, comprising the steps of:

5   connecting a driving force sensor provided to a driving portion of a valve apparatus to a diagnosing apparatus, provisionally fitting an energy sensor for detecting feed energy to said driving portion and a vibration sensor for detecting vibration of said valve apparatus to said valve apparatus;

10   converting detection signals outputted from said three kinds of sensors to predetermined signals in a data conversion unit;

conducting an analytical diagnosing processing of diagnostic data information for each diagnostic item by referring to an allowance value of each diagnostic item calculated from the specification of said

15 valve apparatus and set in advance, and to a maintenance record inclusive of the diagnostic result to judge whether said valve apparatus is normal or abnormal;

conducting further degradation estimation by conducting calculation with past diagnostic results, and preparing a future

20 maintenance plan, thereby making it possible to conduct diagnosis from outside without opening and disassembling said valve apparatus and without cutting off the energy source even during operation of said valve apparatus.

25 2.   A method for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 1, wherein said diagnostic data information includes at least data about aptitude

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evaluation of the driving force of the driving portion of said valve apparatus, data about aptitude evaluation of driving force holding capacity, data about aptitude evaluation of sliding drag of said valve apparatus and of the driving portion, data about aptitude evaluation of

5 a valve opening/closing time, data about aptitude evaluation of wear and loosening of said valve apparatus, and data about aptitude evaluation of a limit stop position of a movable portion.

3.   A method for diagnosing abnormality and estimating

10 degradation in a valve apparatus according to claim 1 or 2, wherein data is collected a plurality of times with time intervals for each of said data described in claim 2, and when the result of the diagnosis is recorded, degradation estimation is conducted on the basis of said result of diagnosis to generate said future maintenance plan.

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4.   A method for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 1, wherein said valve apparatus is an electric valve, and said energy sensor is a current sensor for detecting a feed current to said driving portion or a

20 leakage current.

5.   A method for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 1, wherein said valve apparatus is an electric valve, and said energy sensor is a

25 magnetic sensor for said driving portion.

6.   A method for diagnosing abnormality and estimating

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degradation in a valve apparatus according to claim 1, wherein said driving portion utilizes a rotational force, and said driving force sensor is a torque sensor.

5   7.   An apparatus for diagnosing abnormality and estimating degradation in a valve apparatus, comprising:

a data conversion unit including a driving force sensor for detecting driving force of a driving portion, built in said driving portion of a valve apparatus and connected to a diagnosing apparatus, an energy sensor for detecting feed energy to said driving portion and a vibration sensor for detecting vibration of said valve apparatus that are provisionally fitted to said valve apparatus, said data conversion unit being used for converting detection signals outputted from said three kinds of sensors to predetermined signals; and

a processor connected to said data conversion unit, for collecting data, preserving accumulation of maintenance records including an allowance value of each diagnostic item calculated from the specification of said valve apparatus and set in advance, and the diagnostic result, conducting an analytical diagnosing processing of diagnostic data information for each diagnostic item to judge whether said valve apparatus is normal or abnormal, conducting further degradation estimation while conducting calculation with past diagnostic results, and preparing a future maintenance plan, thereby making it possible to conduct diagnosis from outside without opening and disassembling said valve apparatus and without cutting off the energy source even during operation of said valve apparatus.

8.   An apparatus for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 7, wherein said diagnostic data information includes at least data about aptitude evaluation of the driving force of the driving portion of said valve apparatus, data about aptitude evaluation of driving force holding capacity, data about aptitude evaluation of sliding drag of said valve apparatus and of the driving portion, data about aptitude evaluation of a valve opening/closing time, data about aptitude evaluation of wear and loosening of said valve apparatus, and data about aptitude evaluation of a limit stop device of a movable portion.

9.   An apparatus for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 7 or 8, wherein data is collected a plurality of times with time intervals for each of said data described in claim 8, and when the result of the diagnosis is recorded, degradation estimation is conducted on the basis of said result of diagnosis to generate said future maintenance plan.

10.   An apparatus for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 7, wherein said valve apparatus is an electric valve, and said energy sensor is a current sensor for detecting a feed current to said driving portion or a leakage current.

11..   An apparatus for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 7, wherein said valve apparatus is an electric valve, and said energy sensor is a

magnetic sensor for said driving portion.

12. An apparatus for diagnosing abnormality and estimating degradation in a valve apparatus according to claim 7, wherein said driving portion utilizes a rotational force, and said driving force sensor is a torque sensor.